

before an attack, that the victims do not recognize or respond to appropriately? Do victims maintain an attack by continuing to move or struggle?

• In 8 of the 16 cases, the dog involved either was chained or broke loose from its chain to attack its victim. Does restricting a dog in this manner actually increase the chances of a severe bite?

Clearly, more detailed study is necessary to clarify the behavioral sequence preceding severe attacks.

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A Civilian-Military Partnership to Reduce the Incidence of Gonorrhea

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Synopsis

To reduce the incidence of gonorrhea in the Colorado Springs, Colo., area, casefinding measures (interviewing of patients and tracing of contacts) were conscientiously applied by the local health department, in cooperation with the U.S. Army, to more than 90 percent of reported cases during a 3-year period. Nearly 4,000 cases of gonorrhea—2,127 civilian and 1,811 military—were interviewed; they named 7,399 contacts. A total of 1,141 cases of gonorrhea were newly identified and patients brought to treatment in Colorado Springs as a result. Implementation of these measures was associated with a 12.9 percent overall decline in gonorrhea incidence. This decline was most pronounced in the civilian population (20 percent), while little change in incidence occurred in the military population. The data presented suggest that the orderly application of casefinding epidemiology, allied with other control program initiatives, can interrupt transmission of, and prevent, disease.

IN THE UNITED STATES, civilian and military public health officers are urged to cooperate in the control of venereal diseases by the Seven Point Agreement of 1967 (1), an accord between the Departments of Defense, Transportation, and Health and Human Services and regional health agencies. Its intent is to curb importation and spread of venereal infection to and from military

personnel in American communities. Compliance with the spirit of this document varies, reflecting the health priorities of the local military installation and the allied public health department. An illustration of this civilian-military partnership and its epidemiologic impact, in Colorado Springs, Colo., between 1977 and 1982, forms the subject of this report.

'The two objectives were to improve clinic management and to reduce the incidence of gonorrhea by replacing casual with intensive casefinding techniques . . .'

Methods

Background. The Colorado Springs area had a 1980 Census population of 309,424, including approximately 20,500 U.S. Army and about 9,900 U.S. Air Force personnel. Each of the three local military installations (Fort Carson Army post, Peterson Air Base—NORAD, and the U.S. Air Force Academy) provides its own sexually transmitted disease (STD) diagnostic, therapeutic, and contact-tracing services, with the local health department acting as consultant. The most commonly reported STD is gonorrhea, and the major reporting source is Fort Carson, where STD control is the responsibility of the preventive medicine section of the post hospital.

In late 1979, one of us (D.E.W.) was invited, on a pilot basis, to direct Fort Carson's gonorrhea program. The two objectives were to improve clinic management and to reduce the incidence of gonorrhea by replacing casual with intensive casefinding techniques (interviewing of patients and tracing of contacts). In this setting, "casual" refers to perfunctory patient interviewing or counseling, with neither elicitation of contacts nor field followup; "intensive" refers to conscientious attempts to identify and locate sexual partners.

Study design. This study compares the years 1980 through 1982 (study period) with the preceding 3 years (1977 through 1979, comparison period). Before 1980, gonorrhea control at Fort Carson was managed by rotating medical personnel without special STD training. Beginning in 1980, all gonorrhea patients in Colorado Springs were offered intensive casefinding services. Named contacts were sought through field followup and by encouraging self-referral. Data on cases and contacts were recorded on gonorrhea interview records (CDC 9.97) and venereal disease contact investigation reports (CDC 9.2936). Records of interviews with Air Force personnel with gonorrhea (184 cases) were not consistently maintained; they were excluded from further analysis.

To obtain a clearer view of gonorrhea epidemiology in Colorado Springs, routine casefinding data collection was intensified from January 1 to June 30, 1981. Emphasis was placed on linking patients and their sexual partners into clusters of related infections. This unifying approach facilitated tracing the origin and distribution of disease clusters.

Information on the incidence of gonorrhea in other communities in the United States with large Army installations was solicited by questionnaire to the appropriate State health department STD control officer. The critical ratio for difference of proportions was used to test for significant differences in the observations (2), unless otherwise noted.

Results

Disease trends. The distribution of gonorrhea cases in Colorado Springs from 1977 through 1982 is displayed in table 1. After an initial fall from 1977 to 1978, the annual incidence at Fort Carson remained essentially unchanged. However, cases of gonorrhea among civilians were 20 percent fewer in the study period than in the comparison period. Air Force personnel contributed little

Table 1. Comparative distribution of gonorrhea cases, Colorado Springs, Colo., 1977–82

Location	Comparison period				Study period				Percentage change (comparison period versus study period)
	1977	1978	1979	Average (1977–79)	1980	1981	1982	Average (1980–82)	
Colorado Springs	1,932	1,496	1,531	1,653	1,520	1,537	1,263	1,440	- 12.9
Civilian	1,123	896	900	973	841	856	637	778	- 20
U.S. Army ¹	750	581	603	645	656	643	609	636	- 1.4
U.S. Air Force ²	59	19	28	35	23	38	17	26	- 25.7
Rest of Colorado	9,657	10,062	10,081	9,933	9,964	9,765	8,105	9,278	- 6.6
United States (in thousands) . .	1,000	1,013	1,004	1,006	1,004	991	945	980	- 2.6

¹ Source of reports: Fort Carson.

² Source of reports: Peterson Air Base—NORAD and the U.S. Air Force Academy.

Table 2. Results of interviews with gonorrhea cases, Colorado Springs, Colo., 1977-82

Interviews ¹	Comparison period (1977-79)		Study period (1980-82)	
	Men	Women	Men	Women
<i>Fort Carson</i>				
Number of reported gonorrhea cases	1,787	² 147	1,575	² 333
Number of cases interviewed	1,711	130	1,510	301
Number of contacts elicited ³	1,251 (0.7)	90 (0.7)	2,484 (1.7)	625 (2.0)
<i>Civilian</i>				
Number of reported gonorrhea cases	1,330	1,589	1,017	1,317
Number of cases interviewed	617	910	925	1,202
Number of contacts elicited ³	1,182 (1.9)	2,030 (2.2)	1,580 (1.7)	2,710 (2.3)

¹ Excludes 184 U.S. Air Force cases, 1977-82 (see "Methods").
² About half were women in uniform and half were civilian dependents.
³ Average number of contacts elicited per interview in parentheses.

Table 3. Results of investigation of contacts of gonorrhea cases, Colorado Springs, Colo., 1977-82

Results ¹	Comparison period (1977-79)		Study period (1980-82)	
	Number	Percent	Number	Percent
<i>Fort Carson</i>				
Infected (new cases)	181	20.7	553	37.1
Not infected	222	25.4	452	30.3
Not examined ²	471	53.9	486	32.6
Total	874	100.0	1,491	100.0
<i>Civilian</i>				
Infected (new cases)	401	22.7	588	24.8
Not infected	846	47.8	1,049	44.3
Not examined ²	523	29.5	730	30.9
Total	1,770	100.0	2,367	100.0

¹ Excludes all contacts sought outside the Colorado Springs area (returns are inconsistent), and infected, previously treated contacts requiring no investigation beyond a search of health department records.
² Not found or refused examination.

to the disease burden: the annualized risk ratio for Army personnel compared with Air Force personnel was 9.7.

Interviewing of patients and tracing of contacts. The average number of contacts elicited per civilian case of gonorrhea was similar in both 3-year periods and comparable to the Fort Carson experience during the study period. Improved casefinding substantially reduced the male-to-female ratio of Fort Carson cases during the study period, from 12:1 to 4.7:1 (table 2). This ratio was only modestly improved in the civilian sector.

During the study period, nearly twice as many new, previously untreated cases (1,141) were identified as in the comparison period (582) (table 3). Most of this gain occurred among contacts linked to Fort Carson cases. Concomitantly, a substantial decline in the proportion of

unexamined contacts linked to Fort Carson cases was observed (53.9 percent versus 32.6 percent).

Patients' referral behavior. Data on patients' tendencies to refer their own sexual partners were consistently tabulated between January and June 1981 only. Of the sexual partners who could be traced and were eligible for examination, about 30 percent were successfully referred by the person who had the index case (127 of 503 male partners; 157 of 472 female partners). However, one-half of all infected partners newly brought to treatment presented by this means (55 of 113 males; 115 of 219 females).

Identification of cases. Patients with gonorrhea were identified by spontaneous presentation with symptoms (volunteers), screening, or contact tracing. The net decrease of 639 cases between study and comparison periods was almost completely accounted for by a decrease in volunteers (-678). The decrease in cases identified by screening (-156) was balanced by an increase in contacts (+195). Repeat infections declined from 10.4 percent (515 of 4,959 cases) to 8.1 percent (351 of 4,320) during the study period, a net decrease of 22 percent (χ^2 13.94; $P < .001$).

Special observation period. The 793 gonorrhea cases reported in Colorado Springs between January 1 and June 30, 1981, when epidemiologically linked with their infected sexual partners, formed 385 interrelated clusters. There were 515 cases (64.9 percent of the total) emanating from Fort Carson; these 306 military personnel and their 209 positive contacts formed 198 clusters. Exogenous acquisition of gonococcal infection with subsequent introduction into Colorado Springs was shown or deemed probable in 57 percent of Fort Carson-related clusters (113 of 198). Of the remainder (85 of 198), infection was either acquired locally or its origin could not be deter-

mined. For the 278 non-Fort Carson-related cases, the importation rate was 38 percent (71 of 187 clusters; $P < .001$ for the difference between military and civilian importation rate).

Survey of Army installations. Excluding Fort Carson, there are 25 major (each with more than 5,000 active-duty personnel) Army installations in the nation. Gonorrhea case rates at the 21 installations for which data were supplied ranged from 1,497 to 9,695 per 100,000 in 1981 (mean = 5,058; median = 4,509), placing Fort Carson's rate of 3,137 well below the average. These installations, with a total of 19,968 cases in 1981, accounted for 54.6 percent of the gonorrhea cases in their communities, though the range of impact was considerable (4.8 percent to 92 percent).

Discussion

The Seven Point Agreement of 1967 directs military and civilian authorities in the United States to make "consistent and continuous" efforts to detect and control venereal diseases. In Colorado Springs, the evolution from casual (1977 through 1979) to vigorous (1980 through 1982) compliance with the spirit of this directive was associated with a 20 percent decline in the incidence of gonorrhea in the civilian community by 1982. Little reduction was experienced in overall incidence among military personnel, although a substantial increase in the proportion of women was observed, suggesting a more subtle effect of casefinding activity. That more than half of the cases associated with Fort Carson are exogenous in origin may account in part for the constant rate.

Public health workers have long been pessimistic about the use of casefinding measures in the control of gonorrhea. Nationally, between 1977 and 1981, 5,012,464 gonorrhea cases among civilians were reported; 36 percent of these patients were interviewed for information on sexual partners, yielding a modest 0.9 contacts per case (3-6). Federally sponsored demonstration projects to test casefinding efficacy were implemented several times between the early 1950s and the late 1970s. Although details have not been published, various reasons were advanced (7,8) for the failure of these initiatives to effect incidence reduction. Perhaps the projects were prematurely abandoned.

Casefinding has been called the "sleeping giant" of STD control. Our experience suggests that conscientious and sustained application of this epidemiologic method can reduce incidence appreciably. Indeed, the only major program change at the start of the study period was intensification of casefinding activity: quantitatively in the civilian sector and qualitatively at Fort Carson, as

evidenced by an increase in the proportion of civilian cases interviewed, in the number of contacts elicited from military patients, and in the number of new contacts brought to treatment, as well as by a decrease in the proportion of contacts of military patients who were not examined. Other gonorrhea control activities in Colorado Springs—for example, clinic management, screening, liaison with private physicians, and intensive focus on high-risk groups—have not materially altered since 1976.

The data in table 1 point to two reductions in incidence: one in 1982 and an earlier one in 1978. The earlier one was probably achieved through active casefinding efforts as well; in that instance, a targeted approach to high-risk groups and asymptomatic men was used (9,10). Of importance in both instances is the observation that incidence reduction occurred 2 years after the institution of these intensive and focused epidemiologic efforts. The 1982 reduction in incidence must, of course, be set in the context of declining gonorrhea incidence in the United States and in Colorado. The Colorado Springs gradient was steeper, however, and superimposed on the previously reduced incidence level.

The data suggest that orderly application of casefinding epidemiology to specific targets can interrupt transmission and prevent disease. Evidence is found in the decreased number of volunteers (usually acutely ill, recently infected patients such as men with frank urethritis and women with genitourinary or upper genital tract complaints), the 22 percent decrease in repeat infections, and the high proportion of exogenous infection in both the civilian and the military sectors.

It is possible that other factors—including changes in the biology of *Neisseria gonorrhoeae* and in sexual behavior, or simply random variation—influenced our results; of these possibilities, random variation is the most plausible. In any case, it is encouraging to note that the epidemiologic gains observed during the study period were linked with an increase in productivity rather than in personnel. Achieving measurable impact on disease levels in a community, through use of intensified casefinding, may not be as expensive in terms of additional staffing as supposed. Certainly, in a setting where probably half of the infected and untreated sexual partners of gonorrhea patients are not self-referred to examination, the importance of such efforts is apparent.

Further reduction in gonorrhea levels in Colorado Springs may require either approaches that directly influence importation or the introduction of safe vaccines. Meanwhile, conscientiously applied casefinding methods help circumscribe the problem and may be applicable to other American communities where the gonorrhea burden is similarly dominated by the presence of large Army installations.

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Agreement of Occupation and Industry Data on Rhode Island Death Certificates with Two Alternative Sources of Information

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Synopsis

There is increasing interest in documenting the putative health effects of occupational hazards, prompting Federal and State efforts that rely primarily on occupational information obtained from the death certificate. Previous studies have assessed the agreement of occupational data on death certificates with actual lifetime employment by using current employment data from

census records for comparisons. Such analyses have largely been confined to males.

We compared lifetime occupational information obtained from a panel survey for both sexes with death certificate data for 446 deceased panel members. After adjusting for inadequate information, the occupation recorded on the death certificates of the men agreed with the occupation recorded in the survey 66 percent of the time. The comparable percentage for the industry where the deceased had been employed was 78 percent. Among the women's records, agreement on occupation was 65 percent, and on industry, 69 percent.

Using another sample of death certificates, comparisons of the information for 322 decedents with city directory data produced similar results. The higher level of agreement for women was due in part to the large number who were reported as "housewives." In a separate analysis, the agreement rate for nonhousewives declined. Suggestions for improvements in the recording of occupational data and the constraints imposed by the use of death certificate data in occupational epidemiology are presented.

THERE IS INCREASING INTEREST in documenting the putative effects of occupational and environmental hazards on the development of morbidity and mortality. One persistent problem is the lack of reliable and meaningful occupational health data.

Recent efforts have attempted to address the pressing need for information in this critical area. Both the U.S. National Committee on Vital and Health Statistics (1) and the National Center for Health Statistics (2) have expressed interest in modifying morbidity- and mor-